PETROLOGY AND *IN SITU* TRACE ELEMENT CHEMISTRY OF A SUITE OF R CHONDRITES.

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Introduction: Rumuruti (R) chondrites are characterized by low chondrule/matrix modal ratios, high oxidation state, small mean chondrule size, abundant sulfides and low metal contents, and are of petrologic types 3 to 6 [1, 2]. LAP 04840 (R5, [3]) and MIL 11207 (R6), contain the high-T hydrous phases amphibole and mica [3, 4]; not all equilibrated R chondrites contain these [2]. R chondrites thus can provide evidence on whether there are compositional effects caused by high-T, high-fluid metamorphism of nebular materials. We are investigating a suite of R chondrites of diverse petrologic grades to further understand the nature of the metamorphic processes that engendered them [5]. We report on our petrological studies, plus preliminary *in situ* analyses of trace elements in amphibole-bearing R chondrites.

Results and Discussion: LAP 03639, classified as R4, is a breccia dominated by more primitive material. Chondrules/chondrule fragments in LAP 03639 contain magnesian olivine grains ($Fa_{1\text{-}34}$) distinct from the mode ($Fa_{\sim 39}$); a pyroxene-rich clast contains Fa_{10} olivine; melt clasts contain zoned olivine (Fa_{15} to Fa_{45}). LAP 03639 is distinct from R4 LAP 031156 with which it has been paired [6] (*cf.* [5]). LAP 03639 olivines have Cr contents within the range of those of types 3.4-3.5 L and LL chondrites [7]. Olivines in R4-R6 have high and uniform NiO contents (0.37-0.41 wt%). Those in more primitive members are low and variable (≤0.02 to 0.31 wt%); the highest concentrations are in grains near the R chondrite mode Fa composition. The data are consistent with oxidation of Ni during metamorphism resulting in transport of Ni from sulfides to silicates. However, matrix olivines in R3 chondrites are ferroan [8]. If they are Ni-rich, then the high Ni contents of R4-R6 olivines could reflect equilibration with matrix grains. There is a positive correlation between Ni and Co in LAP 04840 olivines and pyroxenes indicating Co was also mobilized during metamorphism. The Ni and Co contents of olivine are greater than those of orthopyroxene. Olivine grains in MIL 11207 have a narrower range in Cr contents than do those in LAP 04840 suggesting a slightly lower metamorphic grade in the latter. This is consistent with plagioclase-amphibole thermometry which yields higher T for MIL 11207 [3, 9]. LAP 04840 olivine and pyroxene grains show positive Cr-V correlations.

Key Findings: LAP 03639, allegedly an R4, is misclassified; it is a breccia containing some material possibly as primitive as R3.4-3.5. Moderately-siderophile-element contents of olivine indicate metamorphic mobilization, either by transfer from sulfides or through equilibration with ferroan matrix olivine.

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